Amendments to the Claims

Claim 1 (Currently amended): A method for controlling a controlled operation by determining a lag in measured data from at least one actual variable signal, comprising:

processing the measured data using time-series analysis with a filter to produce filtered data with reduced noise content;

arranging the filtered data in matrices with one column for each actual variable signal;

shifting the columns of the matrices to produce a plurality of different shifted matrices, each shifted matrix having a given value for the lag in data for each actual variable signal;

processing each shifted matrix with a variable signal estimator to output a variable signal function for each actual variable signal that defines each actual variable signal in terms of its mathematical dependencies on all of the variable signals;

processing each actual variable signal function with a criterial function to provide an optimal lag value for each actual variable signal;

processing each shifted matrix with a point calculation algorithm to produce a point for each column in each shifted matrix;

processing each point and each optimal lag value with a lag estimator to output a lag function for each lag, each lag function defining each lag in terms of its mathematical dependency on all of the actual variable signals;

determining the goodness of fit of each lag function based on the most recent filtered data;

storing at least one lag function based on its goodness of fit; and

discarding at least one lag function based on its goodness of fit.

Claim 2 (Original): The method of claim 1, wherein the filter is a 1-D filter.

Claim 3 (Original): The method of claim 2, wherein the filter is a time series approximator.

Claim 4 (Original): The method of claim 1, wherein the filter is an n-D filter.

Claim 5 (Original): The method of claim 1, wherein the variable signal estimator is selected from the group consisting of: topological-algebraic infinite-dimensional methods, clustering algorithms, self-organized map (SOM) algorithms, expectation-maximization (EM) algorithms, genetic algorithms (GA), maximum likelihood training of hidden Markov model (MLTHMM) algorithms, neural networks, linear correlation and regression algorithms, nonlinear correlation and regression algorithms, factor analysis (FA) algorithms, and real-time computation of time-recursive discrete sinusoidal transforms (DST) algorithms.

Claim 6 (Original): The method of claim 1, wherein the criterial function utilizes optimization methods to provide an optimal lag value for each variable signal.

Claim 7 (Original): The method of claim 1, wherein the point calculation algorithm averages the values of each column in a given matrix to produce a point for each column in each shifted matrix.

Claim 8 (Original): The method of claim 1, wherein the lag estimator is selected from the group consisting of: topological-algebraic infinite-dimensional methods, clustering algorithms, self-organized map (SOM) algorithms, expectation-maximization (EM) algorithms, genetic algorithms (GA), maximum likelihood training of hidden Markov model (MLTHMM) algorithms, neural networks, linear correlation and regression algorithms, nonlinear correlation and regression algorithms, factor analysis (FA) algorithms, and real-time computation of time-recursive discrete sinusoidal transforms (DST) algorithms.

Claim 9 (Currently amended): A method for controlling a controlled operation by determining a lag in measured data from at least one <u>actual</u> variable signal, comprising:

arranging the data in matrices with one column for each actual variable signal;

shifting the columns of the matrices to produce a plurality of different shifted matrices, each shifted matrix having a given value for the lag in data for each actual variable signal;

processing each shifted matrix with a variable signal estimator to output a variable signal function for each variable signal that defines each variable signal in terms of its mathematical dependencies on all of the variable signals; and

processing each variable signal function with a criterial function to provide an optimal lag value for each variable signal.

Claim 10 (Original): The method of claim 9, wherein the variable signal estimator is selected from the group consisting of: topological-algebraic infinite-dimensional methods, clustering algorithms, self-organized map (SOM) algorithms, expectation-maximization (EM) algorithms, genetic algorithms (GA), maximum likelihood training of hidden Markov model (MLTHMM) algorithms, neural networks, linear correlation and regression algorithms, nonlinear correlation and regression algorithms, factor analysis (FA) algorithms, and real-time computation of time-recursive discrete sinusoidal transforms (DST) algorithms.

Claim 11 (Currently amended): The method of claim 9, wherein the criterial function utilizes optimization methods to provide an optimal lag value for each actual variable signal.

Claim 12 (Currently amended): A method for controlling a controlled operation by determining the lag in measured data from at least one variable signal, comprising:

arranging the data in matrices with one column for each actual variable signal;

shifting the columns of the matrices to produce a plurality of different shifted matrices, each shifted matrix having a given value for the lag in data for each actual variable signal;

processing each shifted matrix with a variable signal estimator to output a variable signal function for each variable signal that defines each actual variable signal in terms of its mathematical dependencies on all of the actual variable signals;

processing each actual variable signal function with a criterial function to provide an optimal lag value for each variable signal;

processing each shifted matrix with a point calculation algorithm to produce a point for each column in each shifted matrix; and

processing each point and each optimal lag value with a lag estimator to output a lag function for each lag, each lag function defining each lag in terms of its mathematical dependency on all of the variable signals.

Claim 13 (Original): The method of claim 12, wherein the variable signal estimator is selected from the group consisting of: topological-algebraic infinite-dimensional methods, clustering algorithms, self-organized map (SOM) algorithms, expectation-maximization (EM) algorithms, genetic algorithms (GA), maximum likelihood training of hidden Markov model (MLTHMM) algorithms, neural networks, linear correlation and regression algorithms, nonlinear correlation and regression algorithms, factor analysis (FA) algorithms, and real-time computation of time-recursive discrete sinusoidal transforms (DST) algorithms.

Claim 14 (Currently amended): The method of claim 12, wherein the criterial function utilizes optimization methods to provide an optimal lag value for each actual variable signal.

Claim 15 (Original): The method of claim 12, wherein the point calculation algorithm averages the values of each column in a given matrix to produce a point for each column in each shifted matrix.

Claim 16 (Original): The method of claim 12, wherein the lag estimator is selected from the group consisting of: topological-algebraic infinite-dimensional methods, clustering algorithms, self-organized map (SOM) algorithms, expectation-maximization (EM) algorithms, genetic algorithms (GA), maximum likelihood training of hidden Markov model (MLTHMM) algorithms, neural networks, linear correlation and regression algorithms, nonlinear correlation and regression algorithms, factor analysis (FA) algorithms, and real-time computation of time-recursive discrete sinusoidal transforms (DST) algorithms.

Claim 17 (Currently amended): A method for determining a lag in measured data from a<u>n actual</u> variable signal, comprising:

filtering the measured data;

arranging the measured data into matrices, including one column for each <u>actual</u> variable signal;

producing a plurality of shifted matrices with a value for the lag data for each <u>actual</u> variable signal;

processing each shifted matrix to output a variable signal function for each <u>actual</u> variable signal;

processing each <u>actual</u> variable signal function with a criterial function to produce an optimal lag value for each <u>actual</u> variable signal;

processing each shifted matrix with a point calculation algorithm to produce a lag value for each column in each shifted matrix;

processing each lag value and each optimal lag value with lag estimator to output lag function for each lag; and

determine its goodness of fit for each lag function.